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**FINAL WORK PLAN PRELIMINARY ASSESSMENT AND POTENTIAL RELEASE
OF PER AND POLYFLUOROALKYL SUBSTANCES MCB QUANTICO VA**

07/12/2018
CH2M HILL

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FINAL WORK PLAN

**Preliminary Assessment
Potential Release of Per- and Polyfluoroalkyl Substances (PFAS)**

**Marine Corps Base Quantico
Quantico, Virginia**

Contract Task Order JU16

July 2018

Prepared for

**Department of the Navy
Naval Facilities Engineering Command
Washington**

Under the

**NAVFAC CLEAN 9000 Program
Contract N62470-16-D-9000**

Prepared by



Chantilly, Virginia

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Acronyms and Abbreviations

µg/L	micrograms per liter
AFFF	aqueous film forming foams
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CLEAN	Comprehensive Long-Term Environmental Action Navy
CTO	Contract Task Order
ECF	electrochemical fluorination
FTA	fire training area
LHA	lifetime health advisory
MCAF	Marine Corps Air Field
MCBQ	Marine Corps Base Quantico
MPR	Monthly Project Report
NAVFAC	Naval Facilities Engineering Command
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutane sulfonate
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
POC	Point of Contact
PPE	probable point of entry
Ppt	parts per trillion
QPMT	Quantico Project Managers Team
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

Introduction

The Naval Facilities Engineering Command (NAVFAC) Washington has contracted CH2M under the Navy Comprehensive Long-term Environmental Action Navy (CLEAN) 9000 Program, Contract Task Order (CTO) JU16 to complete a Basewide Preliminary Assessment (PA) regarding potential releases of per- and polyfluoroalkyl substances (PFAS), such as from the use of aqueous film forming foam (AFFF), at the Marine Corps Base Quantico (MCBQ).

This work plan defines all of the necessary operating parameters, procedures, and protocols to perform the PA at MCBQ. This work plan is intended to:

- Identify the overall objective of the PA.
- Identify and describe both the technical approach and scope of work of the PA.
- Establish data management and presentation guidelines.
- Establish final reporting guidelines.
- Identify key project team members and their corresponding responsibilities and management roles on the project.

This document is intended to be followed by all personnel working on the PA to ensure that all generated data and PA evaluations are reliable, comparable, and scientifically valid.

1.1 Purpose and Objectives

The purpose of the PA is to determine possible environmental releases of PFAS resulting from the use and storage of AFFF, and possibly other materials, at MCBQ. The PA will also differentiate sites that warrant further investigation from sites that pose little or no potential threat to human health and the environment.

The objectives of the PA are to:

- Research documented fire training area (FTA) sites, burn areas, and electroplating shops within the Administrative Record for MCBQ, as these would be likely to have used/stored AFFF and other materials containing PFAS.
- Gather onsite background data (historical or operational records, incident reports, crash data, and photo interpretation).
- Conduct interviews to identify and document locations (sites) where PFAS releases may have occurred.
- Acquire digital photographs and estimate location coordinates of each identified site.
- Assess potential source area at, or near each identified site.
- Evaluate information collected to determine if a site warrants further investigation, including soil or groundwater sampling.
- Provide initial overview of potential contaminant migration pathways from areas where AFFF (and other material containing PFAS) was potentially used/stored and identify potential receptors that may be exposed.

1.2 Background

PFAS are compounds found in a variety of commercial and industrial sources and have been widely used since the 1970s, including AFFF, which was utilized by the Navy for fire training exercises, fire suppression systems, and suppressing aircraft fires or other fires. The Military Specification for AFFF (MIL-F-24385) was formally issued on November 21, 1969. AFFF suppresses combustion by coating the fuel source of the fire, and subsequently preventing oxygen from entering.

PFAS have been identified by the United States Environmental Protection Agency (USEPA) as emerging contaminants, which are defined by the Department of Defense as contaminants that have a reasonably possible pathway to enter the environment, present a potential unacceptable human health or environment risk, and lack or have evolving published regulatory standards (NAVFAC, 2017). As detailed in the NAVFAC Interim PFAS Site Guidance (NAVFAC, 2017), currently there are no Safe Drinking Water Act (SDWA) federal regulations or Clean Water Act Ambient Water Quality Human Health Criteria for any PFAS. For contaminants not subject to national primary drinking water regulation, the SDWA authorizes the USEPA to publish nonregulatory lifetime health advisories (LHAs) or take other appropriate actions. These LHAs are created to assist state and local officials in evaluating risks from these contaminants in drinking water. In May of 2016, the USEPA issued an LHA for two PFAS compounds, specifically perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). Each LHA was established as 70 parts per trillion (ppt) or 0.07 micrograms per liter (µg/L). An LHA when both PFOA and PFOS are detected was also established, at a total concentration of PFOA and PFOS of 70 ppt. Additionally, a risk-based Regional Screening Level has been set for one other PFAS compound, perfluorobutane sulfonate (PFBS); as of June 2017, this level is 400 µg/L (400,000 ppt) for tap water.

PFAS are chemically and biologically stable and are able to resist natural degradation processes, allowing them to persist in the environment. Recognized sources of PFAS in groundwater and soil include:

- Historical firefighter training exercises at FTAs
- Fire stations
- Firefighting equipment testing and maintenance areas
- Burn areas
- Metal plating areas or shops
- Emergency response locations
- Testing or emergency activation of fire suppression systems in hangars and buildings
- Fire suppression system releases in hangars and buildings due to malfunctions
- Stormwater and/or surface water via drainage canals, outfalls, or wastewater treatment plants
- Other locations with historic spills and releases

Areas located within MCBQ may have used, stored, or disposed of AFFF during historical operations. An initial review of historical documents was completed and presented to the Quantico Project Managers Team (QPMT) on April 26, 2017. The PowerPoint presentation and the minutes from this initial desktop review are provided in **Appendix A**. The initial review did not indicate the presence of electroplating activities at MCBQ. Therefore, the PA will primarily focus on AFFF-related PFAS releases. The information from the initial review has been used to create the tables and figures presented in Section 4.

1.3 Report Organization

This work plan includes the following sections:

- **Section 1** provides the purpose and objective as well as the general background of the project and describes the organization and intent of the work plan.
- **Section 2** summarizes the project organization and the roles and responsibilities of CH2M personnel assigned to the project.
- **Section 3** presents a summary of the CH2M project management approach.
- **Section 4** summarizes the preliminary assessment activities that will be conducted at MCBQ.
- **Section 5** presents the records and reporting requirements, including a general outline for a PA report.
- **Section 6** discusses the project schedule.
- **Section 7** lists references used to develop this document.

Project Organization and Staff Responsibilities

This section presents CH2M's project organization and supervisory controls, and details the roles and responsibilities of project personnel.

The Activity Manager/Project Manager will coordinate directly with the Base Point of Contact (POC) on broad organizational and logistical issues, oversee the Task and Team Leaders in the execution of the PA, and provide quality review of reports.

Team Leaders with the support of the Task Leader will perform the research, site visits, interviews, and reporting for the PA at MCBQ.

The roles are supported by additional functional roles, including program management, health and safety, and quality assurance. The roles and responsibilities for assigned project personnel are provided in **Table 2-1**.

Table 2-1. Roles and Responsibilities of Primary Project Personnel

Name	Project Assignment	Responsibilities
Jeff Woodward	MCBQ Activity Manager/ Project Manager	<ul style="list-style-type: none"> • Provide oversight • Conduct periodic internal status reviews • Resolve project-specific issues • Develop and submit monthly project status reports • Develop project planning chart • Coordinate project tasks, staff, and vendors • Coordinate and communicate with the Base POC • Coordinate with Base organizers, other contracted, and government employees to ensure CH2M activities do not interfere or conflict with ongoing site work • Notify the NAVFAC contracting officer and Base personnel of any changes in critical personnel, or any critical issues that may affect the CTO performance and/or human health and the environment • Coordinate with appropriate regulatory agencies, as necessary and at the request of NAVFAC, to ensure compliance with federal, state, and local requirements and regulations • Coordinate with CH2M employees to ensure that project activities do not interfere or conflict with other assigned work • Interface with involved regulators, as directed by NAVFAC, regarding the application of general and site-specific, as directed requirements. • Notify the NAVFAC and Base personnel by telephone or electronic mail, of any potential imminent risk to contracted, federal, or local personnel • Monitor project costs and progress to ensure that the CTO is being executed on budget and schedule • Maintain overall contract compliance
Stacy Bogdanski	Task Leader	<ul style="list-style-type: none"> • Prepare and submit the project work plan to NAVFAC for approval • Work with the Activity Manager/Project Manager to coordinate technical and administrative elements of the project to ensure compliance with technical scope, budget, and schedule • Work with Activity Manager/Project Manager to coordinate project tasks, staff, and vendors • Prepare PA report
TBD	Team Leaders	<ul style="list-style-type: none"> • Perform research and conduct pre-visit coordination with POC at MCBQ • Perform site visit and interviews • Prepare PA report • Communicate issues or needs as appropriate to the Project Manager/Task Leader

Project Management Approach

CH2M's management and planning functions ensure that the CTO is managed efficiently and that key NAVFAC personnel are routinely appraised about the status of ongoing work.

3.1 Scheduling, Planning, and Budgeting

CH2M sequences the project schedule to take into account the interdependencies of overlapping tasks or site work to be performed. The scheduling of logistical requirements, site visits, NAVFAC recommendations, and other variables are considered. A current project schedule is provided in **Appendix B**. CH2M will update the project schedule as necessary and when changes or delays occur.

3.2 Project Communication

The Activity Manager/Project Manager is the primary POC for NAVFAC and Base communication. The Activity Manager/Project Manager will be responsible for communicating with Task and Team Leaders. Task and Team Leaders may coordinate and communicate directly with the Base POC during site visit activities.

3.3 Contractor's Project, Status, and Management Reports

CH2M will prepare Monthly Project Reports (MPRs). The MPRs will include a summary of the events that occurred during the reporting period. The monthly MPR will also include an updated schedule and provide reporting period and project-to-date cost summary information. Invoices will be submitted with the monthly MPRs via the wide area work flow system.

Preliminary Assessment Activities

A PA is a limited-scope investigation performed to distinguish between sites that pose little or no threat to human health and the environment and sites that require further investigation. CH2M will perform a basewide AFFF/PFAS review at MCBQ, including historical research, site visits and interviews with key Base personnel, and will document the findings in a PA Report.

Team Leaders will perform and help coordinate site visit(s) to gather information in preparation of the scheduled interviews. The interview process will use predetermined checklists to streamline the information-gathering process and facilitate the results evaluation. The Site Visit Checklist and Interview Questionnaire are provided in **Appendix C**.

The proposed tasks and duration for conducting the PA are as follows:

Task	Duration (Working Days)
PA Site Visit/Interviews	45 Days
PA Report (Draft Submittal)	60 Days

4.1 Preliminary Assessment Research

To the extent possible prior to the site visits and interviews, CH2M Task and Team Leaders will research information on possible AFFF or PFAS sites documented within the Administrative Record for MCBQ. Documents of interest include, but are not limited to:

- Initial Assessment Study
- Site Management Plan
- RCRA Facility Assessment
- Remedial Investigations (RI)
- Records of Decision
- Decision Documents

This research will include both FTA sites and non-FTA sites. Non-FTA sites are sites where AFFF may have been used or PFAS may have been released, such as burn areas, crash sites, hangars, fuel spill areas, hazardous waste storage facilities, metal plating facilities, landfills, etc. In addition to the Administrative Record research described above, research for non-FTA sites will be conducted onsite using readily available documents obtained from MCBQ to better describe the type or information likely to be needed to facilitate the collection of historic information for each identified non-FTA site. Documents of interest for non-FTA sites include, but are not limited to the following:

- Historical or operational records (hangars, hazardous waste storage, and metal plating facilities)
- AFFF purchase documentation
- Incident reports
- Aircraft crash data
- Inspection reports
- Spill logs Documentation of releases

During the site visit(s) and the interview process, Team Leaders will attempt to gather information on any data gaps identified during the Administrative Record search. During this phase, the Activity Manager or designee will contact and coordinate with the Base POC for the upcoming site visit. The contact information for the Base POC is listed in **Table 4-1**.

Table 4-1. MCBQ – Base Point of Contact

Installation Facility	Base Point of Contact	Telephone Number	Email Address
MCBQ	Brian Ventura	703-432-0521	brian.ventura@usmc.mil

4.1.1 Data Reports

Prior to the site visit, CH2M will request data reports from an environmental data search subcontractor. The data reports will contain the following information:

- Locations of registered private wells and public/municipal water supply wells within the Base boundary and within a 1-mile radius outside of the Base boundary.
- Quantify drinking water populations served by private wells and drinking water populations served by public/municipal wells within the Base boundary and within a 1-mile radius outside of the Base boundary.
- Identify floodplain boundaries and quantify flood emergency zones for surface water bodies.
- Quantify population within the Base boundary and within a 1-mile radius of the Base boundary.
- Identify sensitive environments within the Base boundary and within a 1-mile radius outside of the Base boundary. Examples of sensitive environments include wetlands, threatened or endangered species habitat, designated wilderness areas, and critical habitat.
- For any wetlands identified within the Base boundary or within 1 mile of the Base boundary, provide an appropriate acreage of those wetlands if possible.
- Identify schools (daycare, preschool, primary, secondary, colleges) within the Base boundary and within a 1-mile radius outside of the Base boundary.

The information obtained from these data reports will be used during the evaluation of spatial conditions around each of the sites identified and discussed in the PA Report as explained in Section 5.1 below. The data provided in the reports will be kept on file at the CH2M – Herndon, Virginia Office.

4.2 Interviews/Site Visits

The Activity Manager/Project Manager or designee will be responsible for organizing a pre-visit teleconference with the Base POC prior to site visit(s) to:

- Provide an overview of the site visit, including purpose, background, planned activities, and anticipated needs.
- Request any additional documents for the research and development for the PA.
- Identify Base personnel, including tenants, for interviews.

MCBQ is an active military facility; personnel requiring Base access will be required to provide personal information and a valid form of government-issued photo identification (driver's license, passport, etc.) before they enter the Base. Through the pre-visit teleconference, the Team Leader will request from the Base POC the information, documentation, and/or procedures (for example, security briefings) needed by the Team Leader to access various facilities (including Turner Airfield and the FBI Aviation Team hangar) at the Base. CH2M will ensure all personnel meet the requirements. CH2M will also request from the Base POC the documentation or logs of AFFF and PFAS use, spills, and releases prior to the site visit to help aide the Team Leader during the scheduled interviews.

During the site visit(s) and the interview process, the Team Leader will make reasonable efforts to identify all sites, including FTA sites and non-FTA sites, where PFAS may have been released. For each site identified during upfront research and during interviews, the team will gather all pertinent site-specific documentation available onsite to

verify the use of AFFF/PFAS-containing materials. Access to the sites will be coordinated with the Base POC. A list of potential interviewees is presented in **Table 4-2** and a map of initial areas of interest can found on **Figure 4-1**.

Interviews will be conducted with individuals that have specific or anecdotal knowledge of AFFF/PFAS-containing materials usage, including Natural Resource Managers, Fire Chiefs or their designees, Fire Suppression System Managers for the hangars, Environmental Emergency Responders, Metal Plating Operation Managers, Wastewater Treatment Plant Operators, Hazardous Waste Managers, and Base Historians/Librarians. Interviews will be conducted both in person and by telephone as required. The interview questionnaire developed for this project is provided in **Appendix C**. At a minimum, the field team will go through the questions provided in the questionnaire during the interview process. Additional questions may be asked, as necessary, to clarify responses to the questionnaires and/or develop additional information to further clarify a potential site or release. Information obtained over the telephone will be recorded on a Record of Communication form (**Appendix D**) as a means of documenting the source of the information. The Record of Communication will include the following, at a minimum:

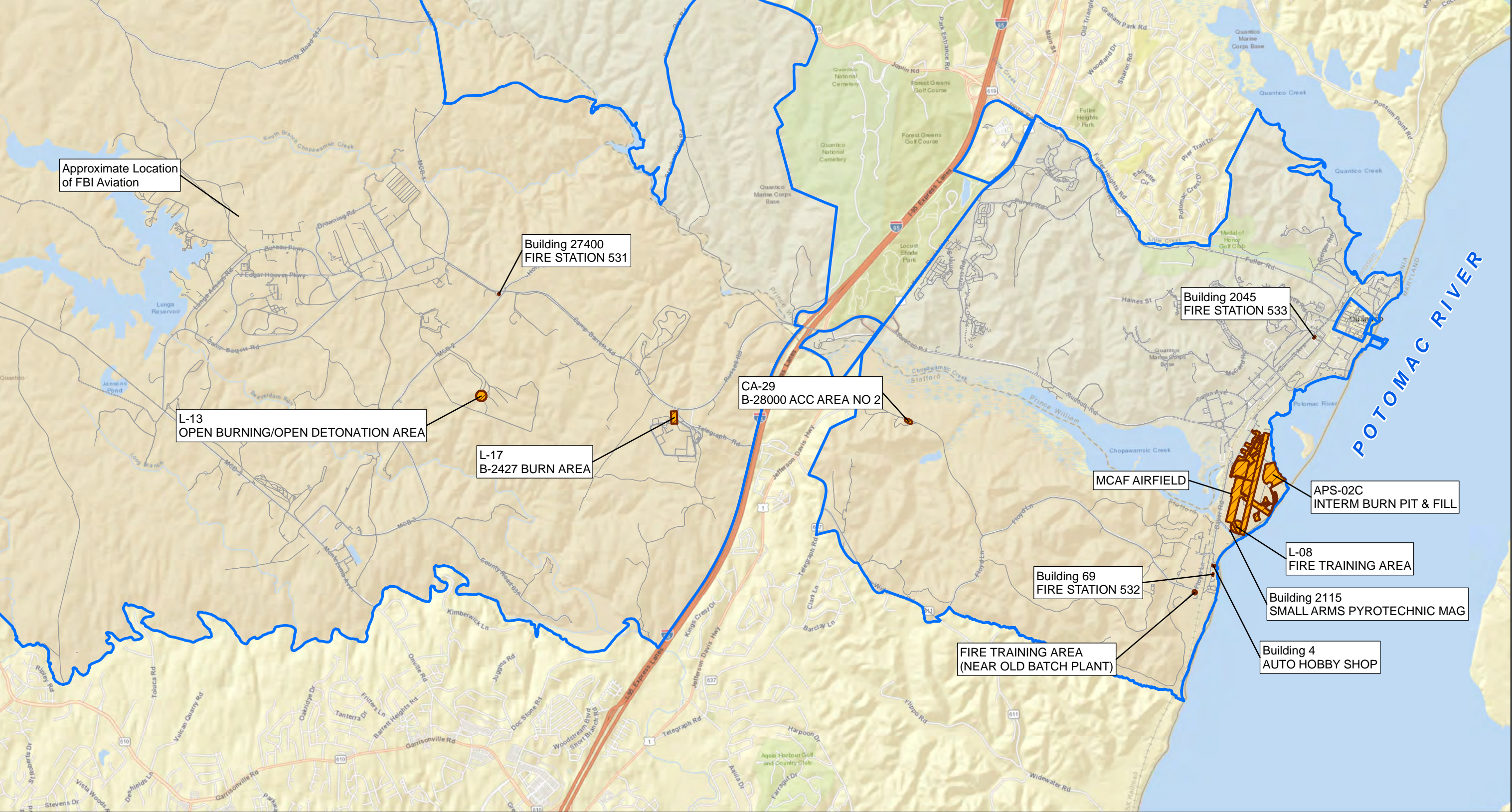
- Base name
- Date and time of the conversation
- Name, affiliation, and telephone number of the person contacted
- Name and affiliation of the person making contact
- Purpose of the conversation
- Questions asked
- Summary of the conversation and pertinent information obtained
- Action items or follow-up activities, if any
- Dated signature of the person making contact

The Team Leader will perform visual observation of known sites as well as potential AFFF/PFAS sources and areas of previous releases. During the site visit, the team will attempt to estimate or measure source areas or volumes wherever possible, and will examine facility files to obtain AFFF quantity data, AFFF handling practices, and possible environmental releases of PFAS not previously identified during file searches and research. These visual observations will be recorded in a field logbook. The Site Visit Checklist is provided in **Appendix C**.

The field team will be responsible for preparing digital photo documentation of each site under investigation. Photography of any kind will be coordinated through the Base POC. A photograph log is provided in **Appendix E**.

Table 4-2. List of Interviewees and Areas of Interest for PFAS Assessment

Building/Place of Interest	Organization/Title	Base Point of Contact	Telephone	Email
Airfield and HMX-1	Aircraft Rescue Firefighting	SSgt Walker	(703) 784-3154	johnny.d.walker@usmc.mil
Building 2115	Officer in Charge, Aircraft Rescue Fire Fighting (ARFF)	Warrant Officer Matthew Weiland	(703) 784-3475	Matthew.weiland@usmc.mil
APS-02C – Interim Burn Pit and Fill Area	Marine Corps Air Field (MCAF) Facilities Manager	Paul Dodd	(703) 432-1689	paul.dodd@usmc.mil
Site 19 (L-08) – Fire Training Area	MCAF Facilities Manager	Paul Dodd	(703) 432-1689	paul.dodd@usmc.mil
L-13 – Open Burn/Open Detonation Area	Range Management Branch	Martin Dankanich	(703) 432-6552	martin.w.dankanich@usmc.mil
L-17 – Building 2427 Burn Area	Environmental Restoration Program Manager	Brian Ventura	(703) 432-0521	brian.ventura@usmc.mil
Fire Training Area (Near Site 5 – Old Batch Plant)	Deputy Fire Chief	Ulysses Taormina	(703) 432-2680	Ulysses.taormina@usmc.mil
FBI Aviation Area	FBI Environmental Protection Specialist	Tammy Gumbita	(703) 632-1329	trgumbita@fbi.gov
Site 46 (CA-29) – Building 28000 Accumulation Area No. 2	Marine Corps Systems Command	Poppy Harrover	(703) 432-3770	poppy.harrover@usmc.mil
Building 5172		**Building contact will be determined		
Jet Engine Test Pad		Sgt McLaren	(703) 784-2571	
Not Applicable	Hazardous Materials	Ruth Jacobson		
Not Applicable	Fire Chief	Bruce Sullivan	(703) 784-3734	
Fire Station 531		Chris Barr	(703) 784-1234	
Fire Station 532/Building 4		Shewana O'Connor	(703) 784-2539	
Fire Station 532/Building 69		Bradley Bryant	(703) 784-2539	
Fire Station 533		Benjamin Money	(703) 784-5228	



- Legend**
- Area of Interest
 - Installation Boundary
 - Roads

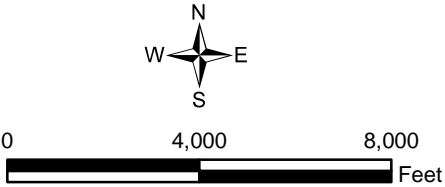


Figure 4-1
Initial Areas of Interest
Preliminary Assessment of PFAS Work Plan
Marine Corps Base Quantico (MCBQ)
Quantico, Virginia

Reporting and Record Requirements

5.1 Reporting

A report will document information gathered during the PA, including the known FTA sites as well as additional sites where PFAS may have been released to the environment. The PA narrative report will summarize what is known about each site, what is inferred or assumed, activities conducted during the site visits, and the information researched. The report will also prioritize which sites will need additional action, including characterization or further investigation. The main body of the report will begin with site and source descriptions, followed by a preliminary evaluation of the threats and receptors associated with each exposure pathway. The summary and conclusions will summarize the most important characteristics of the site and identify the major exposure pathways and receptors of concern (if applicable) and include a table of site prioritization. **Table 5-1** provides an outline that will be used as a guideline for the PA report. Not every bulleted item in each section will be applicable to every site being evaluated. For instance, none of the new or “undiscovered” sites will have a Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) identification number.

Table 5-1. Preliminary Assessment Report – Outline of Contents

1.0	Introduction
1.1	PFAS Background
1.2	History <ul style="list-style-type: none"> State that a PA was performed, name of the agency or organization performing it, and state the authority under which it was conducted (i.e., CERCLA as amended by Superfund Amendments and Reauthorization Act (SARA), and USEPA contract or cooperative agreement). Include the site name, CERCLIS identification number, and location (street address, city, county, state). Briefly state the purpose of the PA (i.e., to assess the immediate or potential threat wastes at the site pose to human health and the environment and to collect information to support a decision regarding the need for further action under CERCLA/SARA) and the scope of the investigations (e.g., research and review file information, comprehensive receptor survey, and an offsite or onsite reconnaissance.)
1.3	Hydrogeologic Setting (Basewide) <ul style="list-style-type: none"> Describe the hydrogeology of the base/installation and briefly explain how it impacts the study.
1.4	Sites <ul style="list-style-type: none"> List all sites including FTAs and non-FTAs identified at the installation (Table X) Include map of all sites (Figure X).
2.0	Fire Training Areas
2.1	Site Name (Include all of the following that apply. For sites with no suspected release, describe the site and discuss operational history only). <p><u>Site Description</u></p> <p>State brief directions to the site. Provide latitude/longitude coordinates. Identify the type of site (e.g., old/current fire training areas), whether it is active or inactive, and years of operation. Describe its physical characteristics (e.g., dimensions, size, structures, buildings, borders, drainage patterns) and setting (e.g., topography, local land users). Include a United States Geological Survey (USGS) 7.5-minute Base map locating the site and showing a 1-mile radius. On the map, identify the surface water drainage route; nearest well, intake, and residence; wetlands and other sensitive environments. Include a drafted site sketch showing features on and around the site.</p> <p><u>Operational History</u></p> <p>Provide an operational history of the site. Identify current and former owners and operators, and describe site activities. Identify and describe wastes generated, quantities, disposal activities, and source areas. Indicate source areas on the sketch. Describe any removals, whether conducted by facility operators or regulatory authorities.</p> <p><u>Waste Characteristics</u></p> <p>Describe past regulatory activities including permits, violations, and inspections by local, state, or Federal authorities (if applicable). Summarize the fire training activities conducted at the site including the types of fuels/flammables used. Indicate the amount and type(s) of AFFF released at the site (if applicable).</p>

Table 5-1. Preliminary Assessment Report – Outline of Contents

Pathway and Environmental Assessment	
Groundwater Pathway	
<ul style="list-style-type: none"> Describe the local geologic and hydrogeologic setting (e.g., stratigraphy, formations, aquifers, karst features, depth and permeability to the shallowest aquifer). Based on the site description, operational history, local geology, and hydrogeology, and any available analytical data, state whether release of a hazardous substance from the site to groundwater is suspected. If analytical data are available, summarize them in a table. Discuss groundwater use within a 1-mile radius. Identify the nearest drinking water well and state the distance to it. Quantify drinking water populations served by wells within 1 mile. Differentiate between populations served by private wells and those served by municipals wells; identify blended systems. Identify drinking water wells suspected to be primary receptors and quantify the populations associated with each. 	
Surface Water Pathway	
<ul style="list-style-type: none"> Describe the local hydrologic setting, including site location with respect to floodplains, and the overland and downstream portions of the surface water migration path. State the distance from the site to the probable point of entry (PPE) to surface water. Identify the water bodies within a 15-mile downstream distance, and state the length of reach and flow characteristics of each. Include a drafted sketch of the surface water migration path. Based on the site description and operational history, local hydrology, and any available analytical data, state whether release of a hazardous substance from the site to surface water and/or surface water sediment is suspected. If analytical data are available, summarize them in a table. Indicate whether surface water within a 15-mile downstream distance supplies drinking water. Identify each drinking water intake and state the distance from the PPE to the nearest intake. Quantify the drinking water population served by surface water and identify blended systems. Identify surface water intakes suspected to be primary receptors and quantify the populations served by each. Indicate whether surface water along a 15-mile downstream distance supports fisheries. Identify each fishery and state the distance from the PPE to the nearest fishery; identify the fishery with the lowest flow characteristics. Identify fisheries suspected to be primary receptors. Indicate whether sensitive environments (e.g., schools or threatened or endangered species habitats) are present in or adjacent to the surface water migration path (overland and along a 15-mile downstream distance). Identify each sensitive environment and state the distance from the PPE to the nearest sensitive environment; identify the sensitive environments with the lowest flow characteristics. Identify sensitive environments suspected to be primary receptors. 	
Soil Exposure and Air Pathways	
<ul style="list-style-type: none"> Indicate the number of onsite workers and the number of people who live outside or within 200 feet of areas of known or suspected contamination. Identify the schools and day care facilities onsite or within 200 feet of areas of known or suspected contamination, and state the number of attendees. Quantify the populations (residents, students, and workers) within 1 mile of the site; state the distance to the nearest regularly occupied onsite or offsite building. Identify sensitive environments onsite or within 1 mile of the site. Discuss the likelihood of a hazardous substance being release to the air. If analytical data are available, summarize them in a table. Identify sensitive environments including wetlands, threatened or endangered species habitat, designated wilderness areas, and critical habitat. 	
3.0	Non-Fire Training Areas
Include the same information listed above in FTA section for non-FTA sites (such as those listed below). For sites with no suspected release, describe the site and discuss operational history only.	
3.1	Hangars
3.2	Fire Stations
3.3	Burn Areas
3.4	Emergency Response
3.5	Landfills
3.6	Other Spills and Releases (including from Plating Shops, Hazwaste Storage, etc.)
4.0	Summary and Conclusions
<ul style="list-style-type: none"> Briefly summarize the major aspects of each FTA/non-FTA and its history that relate to the potential for releases of AFFF or electroplating contaminants. Identify principal pathways and sensitive areas of concern. Discuss 	

Table 5-1. Preliminary Assessment Report – Outline of Contents

	additional qualitative considerations or unusual circumstances that should be brought to the attention of the regional USEPA site assessment personnel.
4.1	FTAs
4.2	Non-FTAs
5.0	Recommendations
	<ul style="list-style-type: none"> • Include recommendations for further site investigation at applicable sites.
6.0	References
	<ul style="list-style-type: none"> • Provide a numbered list, in bibliographic citation format, of all references cited in the PA report.
Appendices	
Appendix A – Photo Documentation Log	
	<ul style="list-style-type: none"> • As an attachment, provide original photographs of the site and pertinent site features (e.g., waste source areas, stained soil, stressed vegetation, drainage paths) taken during the site visit. Provide a written description of each photo in the photo log. Key each photo to its location on the site-specific sketch.
Appendix B – Field Documentation	
Appendix C – Records of Communication	

CH2M will prepare and submit a complete Pre-Draft PA for review by the Navy to get concurrence and approval on the format and content. After approval, the Draft PA report will be submitted for QPMT review in accordance with the project schedule.

5.2 Record Keeping

Records of field activities, interviews, and/or research activities will be documented in the Interview Questionnaire (**Appendix C**) and Record of Communication (**Appendix D**). These documents will be reviewed by the CH2M Activity Manager and retained in the project files for 10 years following project closeout. These documents will also be maintained in the Administrative Record files and incorporated into the Naval Installation Restoration Information Solution electronic database.

SECTION 6

Project Schedule

The activities described in this work plan will be implemented in accordance with the project schedule provided in **Appendix B**. Any updated versions of the project schedule will be submitted to the Navy.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2009. *Draft Toxicological Profile for Perfluoroalkyls*.

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Appendix A

Initial Desktop Review (April 26, 2017)

Quantico Project Managers Team Partnering Meeting – April 26 and 27, 2017

Day 1 – April 26, 2017

ATTENDEES: Stacy Bogdanski/CH2M (SB) Steve Mihalko/Virginia DEQ (SM)
 Jeff Woodward/CH2M (JW) Brian Ventura/MCBQ (BV)
 Victoria Waranoski/NAVFAC Washington (VW) Susan Dubuque/The Management Edge (SD)
 Lisa Cunningham/EPA (LC) Lyndsay Kelsey/NAVFAC Washington (LK)

GUESTS: Dawn Ioven/EPA (DI) – On the phone for the PFAS discussion
 John McCloskey/US Fish and Wildlife Service (JM) – On the phone for the PFAS discussion
 Herminio Concepcion/EPA (HC) – On the phone for the PFAS discussion

9.0 PFAS Desktop Study Topic Excerpts

Desired Outcome: Discuss the PFAS Desktop Study.

JW led the team in a discussion of the Per- and Polyfluoroalkyl Substances (PFAS) Desktop Study via a PowerPoint presentation (attached to these minutes). LC asked if all of the sites were reviewed to determine the current list of potential PFAS sites. JW noted that this presentation was prepared based on the information that we have in the Site Management Plan and other available documents; however, additional sites might be added during this desktop study. It was also noted that no sampling is included with this evaluation.

VW noted that the Navy is currently preparing a guidance document for PFAS. By completing this desktop study before the guidance is completed, the team will be a step ahead. The team (including technical support) agreed with approach.

LC noted that at Willow Grove, one of the issues they encountered was that aqueous film-forming foam (AFFF) was sent to a fire stations off base, so they found AFFF in upgradient locations. This question will be posed to the fire station employees during interviews.

Per- and Polyfluoroalkyl Substances (PFAS) Desktop Evaluation



Marine Corps Base Quantico
Quantico, Virginia

Jeff Woodward (CH2M) and Stacy Bogdanski (CH2M)
Navy CLEAN 9000 Contract, CTO JU16
April 26, 2017



Purpose

- Per Navy overall strategy to manage and address PFAS issues:
 - Navy Cleanup Program: Installation-wide assessments to identify PFAS sites to prioritize future site investigations and remediation based on potential risk to drinking water sources
 - <http://www.secnav.navy.mil/eie/Pages/PFC-PFAS.aspx>
- Provide an overview of PFAS and possible sources for MCBQ
- Discuss possible PFAS sites
- Discuss Path Forward and proposed PFAS Desktop Evaluation Schedule

Introduction

- PFAS compounds are used in formulation of aqueous film-forming foam (AFFF).
 - Used for fire training exercises, suppressing aircraft and other vehicle fires, and in aircraft hanger fire suppression systems
 - Several federal government documents confirm the initial use of AFFF in 1970
 - Production has ceased, but there is continued use of stockpiled AFFF
- PFAS compounds have also been identified as being a component of mist-suppressants in electroplating shops, oil-water separators, and other piping systems.
 - Chrome plating emissions regulations came into affect around 1990
- PFAS should not be a concern for fire fighting, burning, or fire training sites (AFFF sites) prior to 1970 and electroplating sites prior to 1990.

Possible PFAS Sites

- Initial list (provided by NAVFAC):

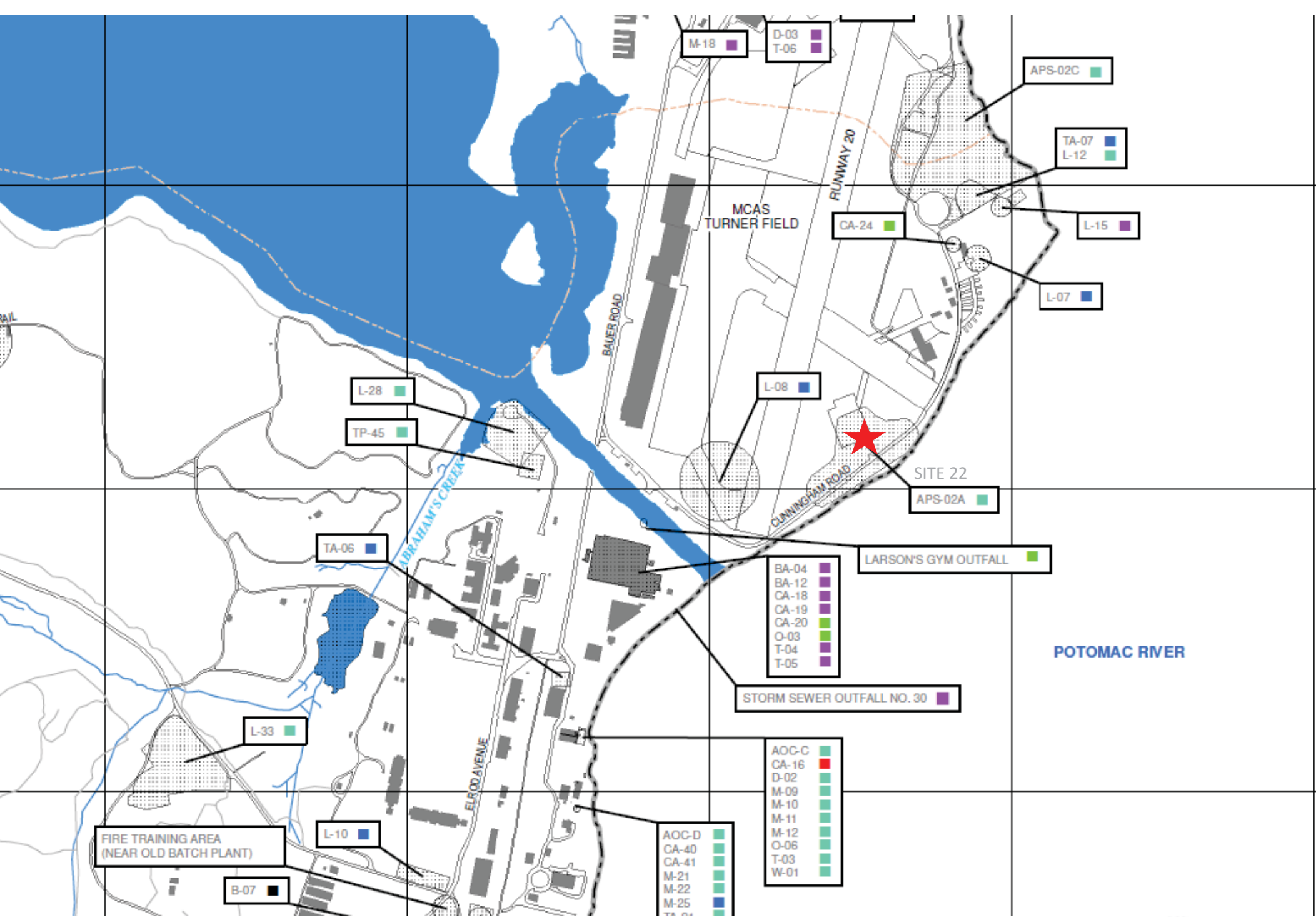
- Site 22 (APS-02A) – Previous Burn Pits
- Site 23 (APS-02C) – Interim Burn Pit and Fill Area
- Site 19 (L-08) – Fire Training (aka APS-02D)
- L-12 – New Burn Pit
- L-13 – Open Burn/Open Detonation Area
- L-17 – Building 2427 Burn Area
- L-19 – Quantico Sanitary Landfill Burn Area

- Potential list additions:

- Fire Training Area (Near Old Batch Plant)
- Site 8 (L-24) – Camp Barrett Disposal Area
- Site 9 (L-27) – Camp Goettge Disposal Area
- TA-07 – New Burn Pit Underground Tank
- Turner Airfield
- FBI Hostage Rescue Team
- Site 46 (CA-29) - Building 28000 Accumulation Area No. 2
- Fire Stations

Site 22 (APS-02A) – Previous Burn Pits

- Limited information in SMP: The site was used for fire training activities between 1953 and 1962 and was graded over with fill by May 1962. The site appeared to be inactive by April 1964 (i.e., the burn pits were no longer visible), but dark stains on the ground surface were still apparent.
- Low probability of PFAS
 - Although the area was used for fire training activities, based on the dates of use (1953 – 1962), AFFF would not have been used.
 - Propose no further action for this site.



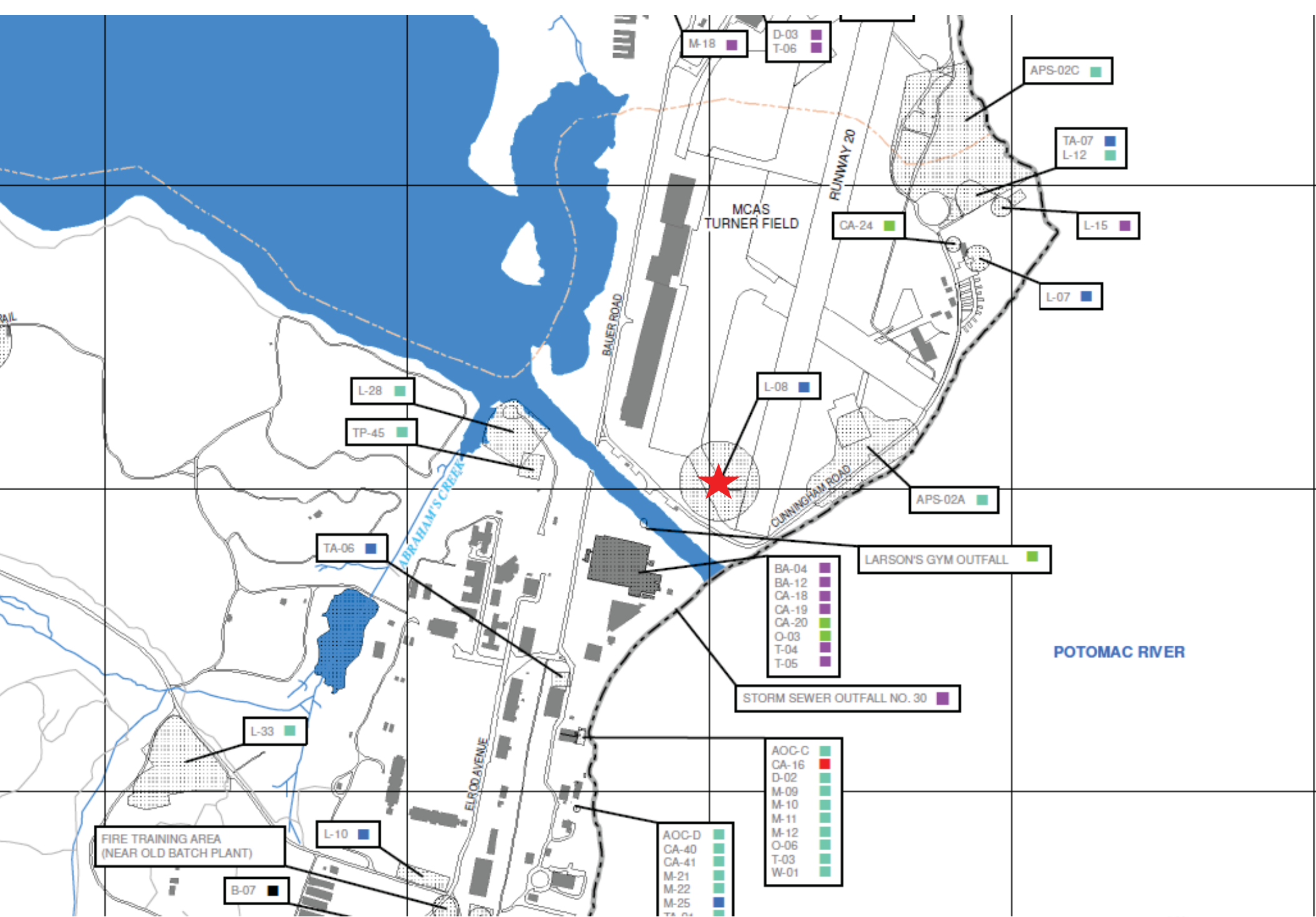
Site 23 (APS-02C) – Interim Burn Pit and Fill Area

- Information from closeout document: Site was used as an active training area between 1981 and 1985; consists of circular craters (result of small charge detonations), mounded material, a burn pit, and a rectangular area of disturbed ground. A storm water retention basin, enclosed by a 5 to 7 ft. high berm, and discharging into the Potomac River, was constructed in the central portion of the site in 1993. Historically, the site has been used for air show bombing simulations, fire training, and as a disposal site for concrete debris.
- Higher probability of PFAS
 - This area was using for fire training post-1970.
 - Additional evaluation is warranted.



Site 19 (L-08) – Fire Training Area (aka APS-02D)

- Information from SMP: The site consisted of a shallow pit, approximately 30 square feet, lined with asphalt material and surrounded by an 8-inch concrete berm with no provision for drainage. The site was used for the training of crash rescue crews. No startup date is available for the site. JP-4 and JP-5 fuel was burned at the unit; degreasing solvents may also have been burned. Fires were extinguished with AFFF and water.
- High probability of PFAS.
 - The SMP expressly states that AFFF was used.
 - Additional evaluation is warranted.



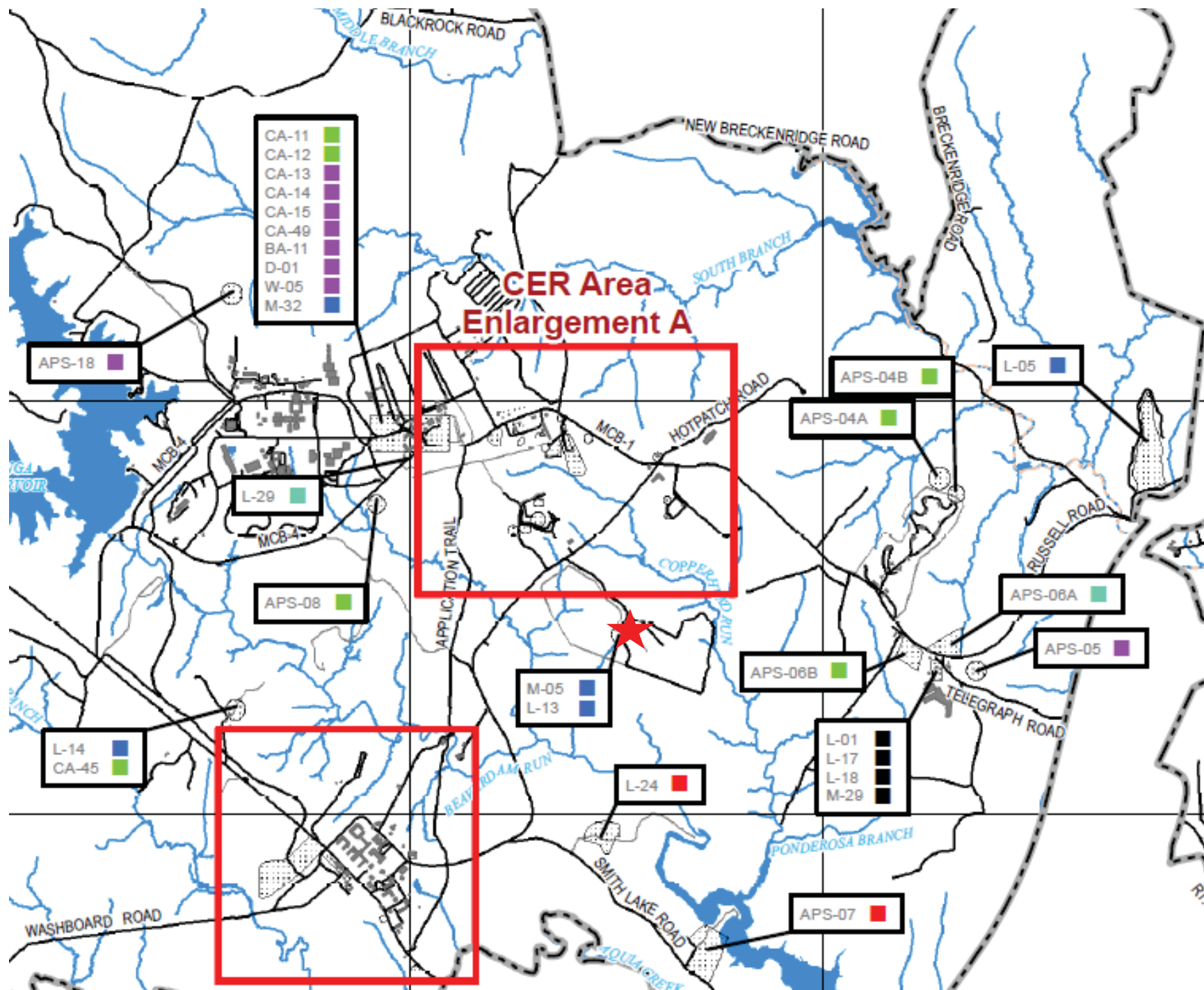
L-12 – New Burn Pit

- Information from the SMP:
 - The site was installed in 1986 directly over the former location of a previous interim burn pit. The pit reportedly has never been used for fire training activities. A concrete pad with a 6-inch berm surrounds the pit, which is approximately 45 feet in diameter. Although the original design for the unit included the installation of an oil/water separator, the separator was never installed, which is supposedly the reason why the pit was never used.
 - Run-off from the site drains via a grate, located in the center of the pit, to two 100,000-gallon underground waste receiving tanks (Site TA-7, New Burn Pit Underground Tank No. 1). The waste receiving tanks were removed in March 1993.
- Low probability of PFAS
 - Unknown if the New Burn Pit was ever utilized.
 - The SMP stated that fire training activities did not occur at this site.
 - Would be evaluated further under APS-02C.
 - Propose no further action for this site.



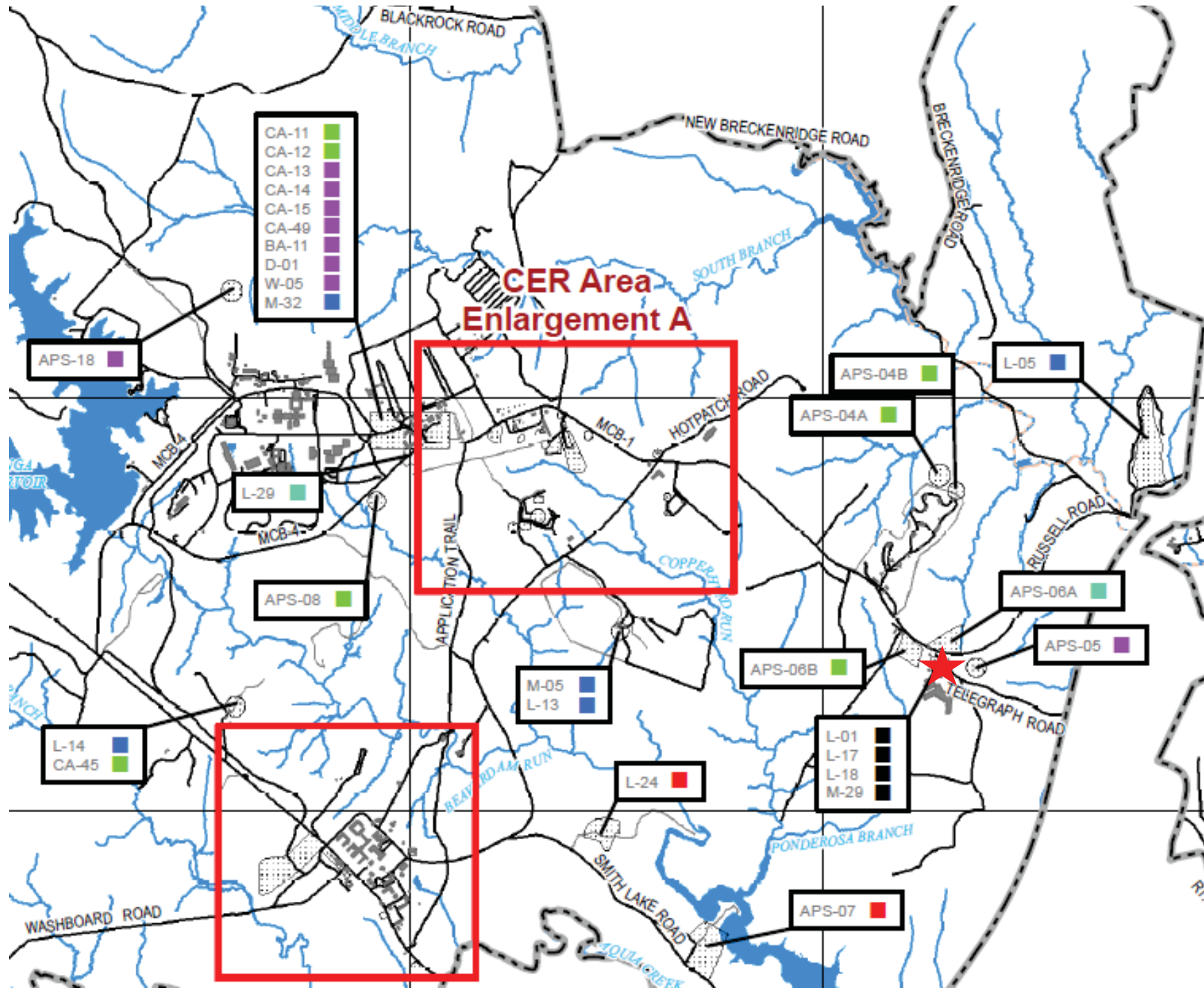
L-13 – Open Burn/Open Detonation Area

- Information from the SMP:
 - The site consists of a series of earthen pits and trenches and is located on a raised fill area that is approximately 400 feet in diameter. The startup date was 1975 and operations ceased in late 1988. Thermal treatment of ordnance and explosive materials occurred at the site. Wood was placed in trenches, soaked with diesel fuel oil, covered with ammunition, and ignited. Waste explosives were detonated in the pits and energetic wastes were open burned in the trenches. The pits used for open detonation ranged in size from 5 feet in radius and 5 feet deep to 10 feet in radius and 12 feet deep. Such pits increased in size with usage, and after a pit attained a certain size, the existing pit was backfilled for reuse. The trenches used for open burning were approximately 35 to 40 feet long, 10 feet wide and 5 feet deep. Trenches remained in place.
- Higher probability of PFAS.
 - AFFF may have been used, as it is noted that diesel fuel oil was ignited.
 - Additional evaluation is warranted.



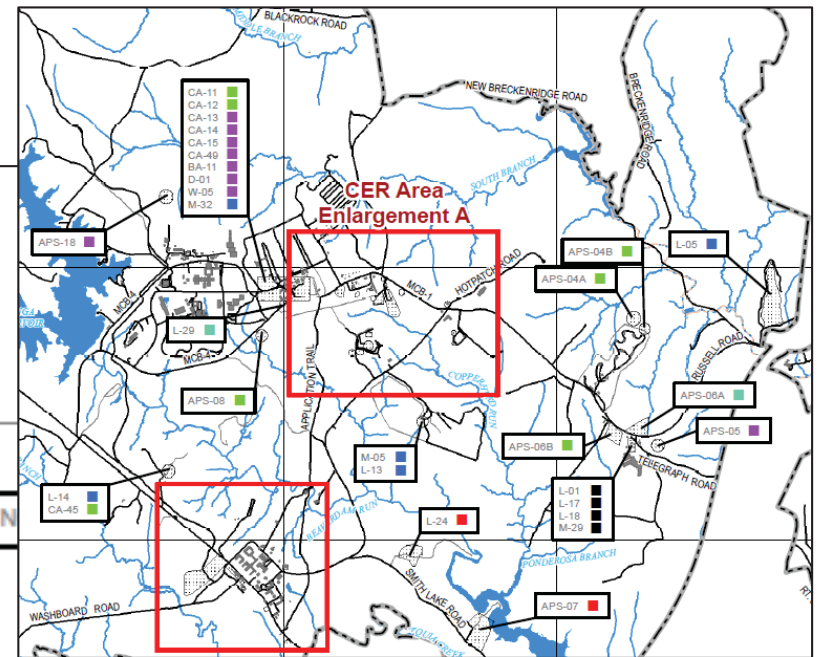
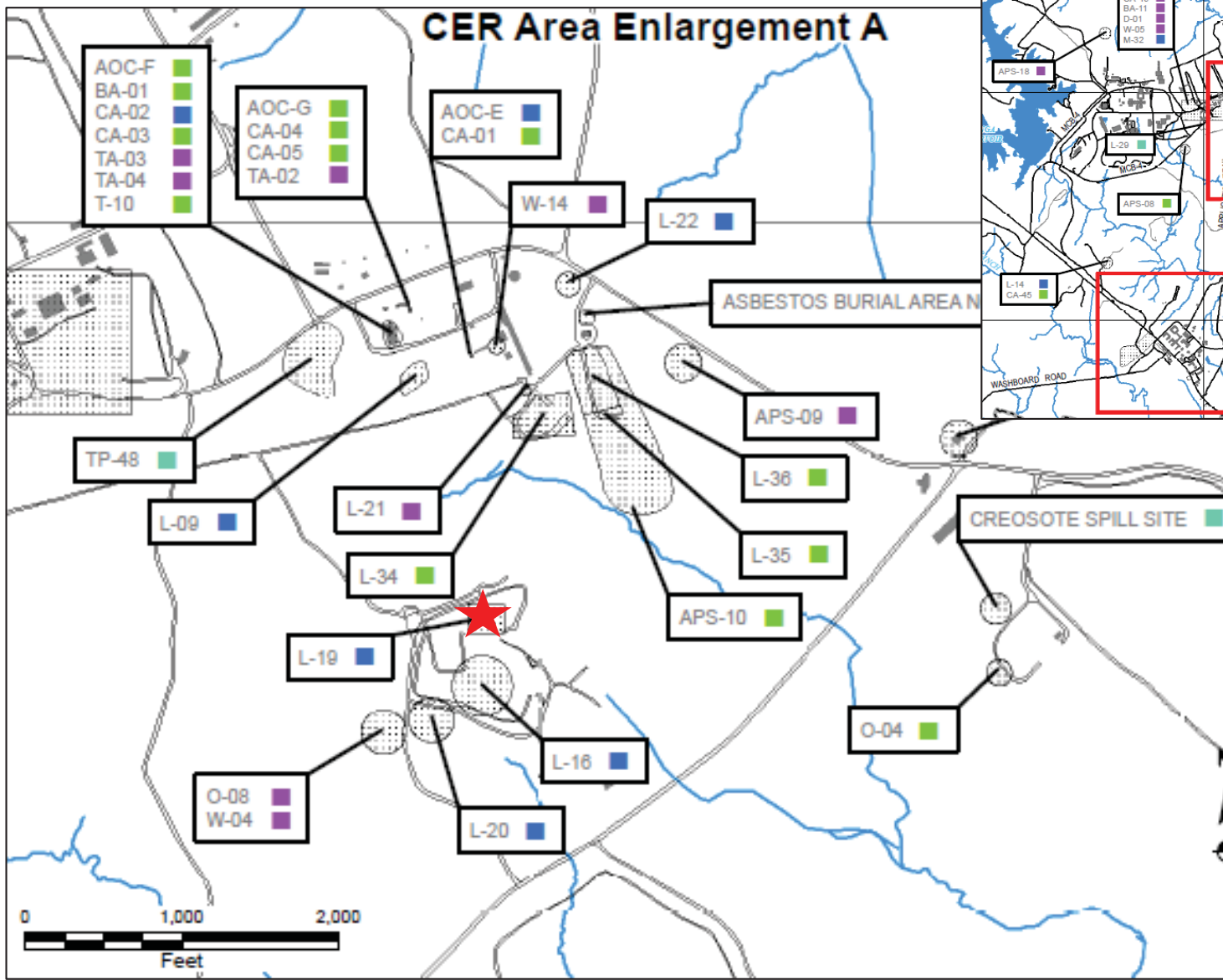
L-17 – Building 2427 Burn Area

- Information from the SMP: No startup or closure dates are available. The unit, which was used for open burning, was approximately 80 feet long by 20 feet wide. The specific wastes burned at the site are unknown. Ash residue was observed at the site during a site visit.
- Lower probability of PFAS.
 - However, the dates of use and wastes burned are unknown.
 - Additional evaluation is warranted.



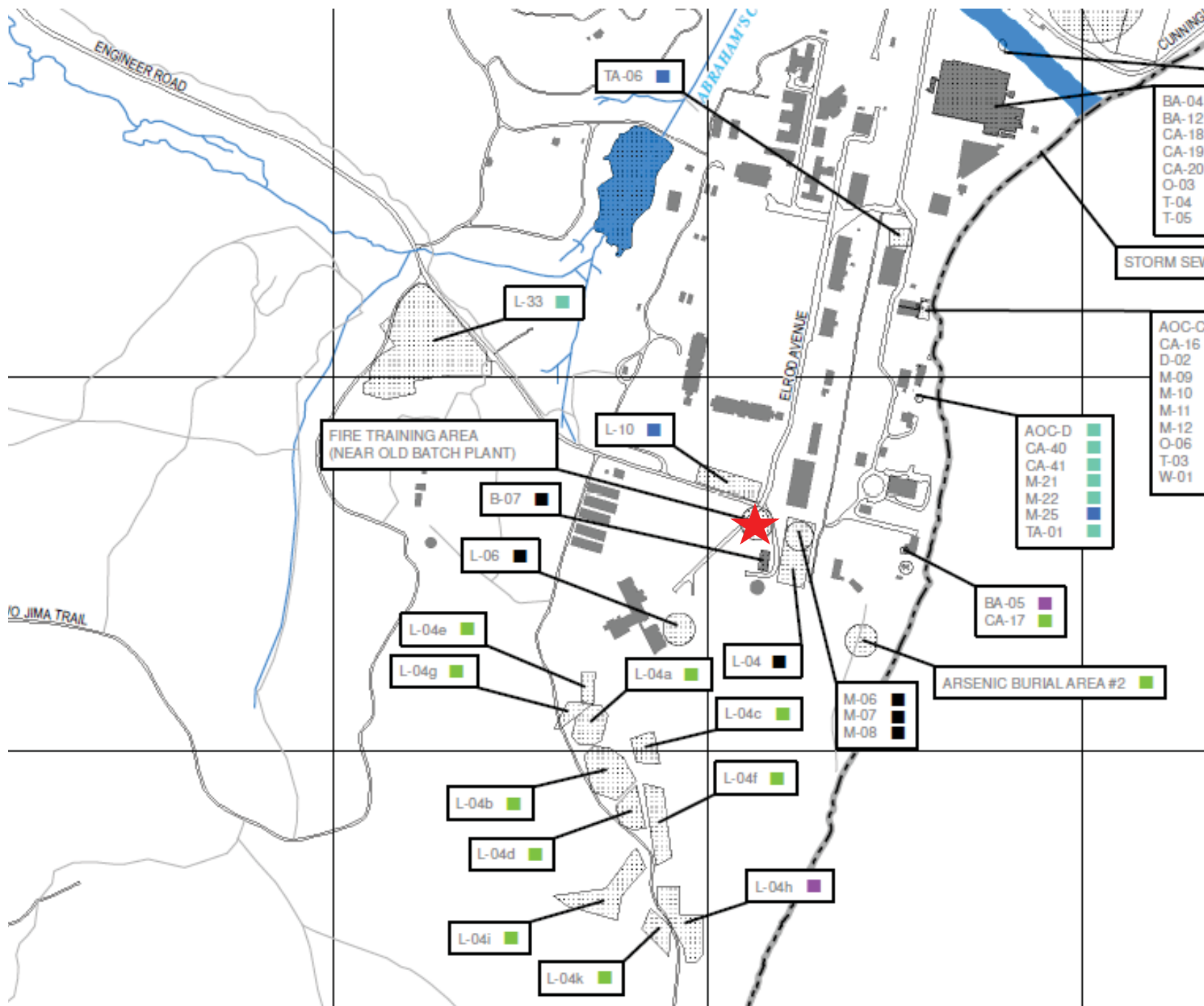
L-19 – Quantico Sanitary Landfill Burn Area

- Information from the SMP: The burn permit for this site was first applied for on May 14, 1986; however, open burning activities were conducted at the site prior to this date. Wastes burned at the site include brush, tree trimmings, yard and garden trimmings, and similar land-clearing refuse and clear-burning waste from construction and demolition operations.
- Low probability of PFAS.
 - The items burned would not have required AFFF.
 - Propose no further action for this site.



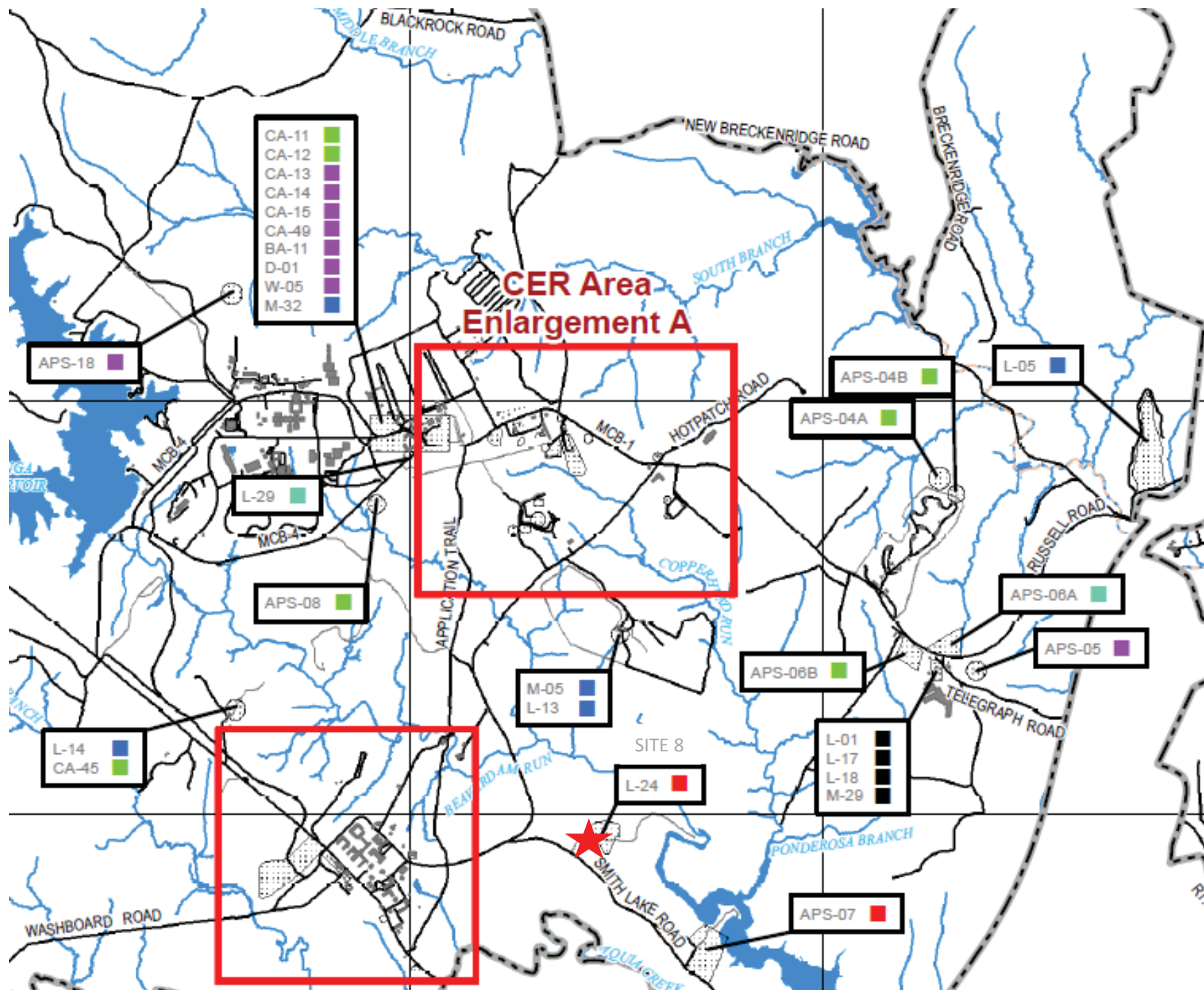
Fire Training Area (Near Site 5 - Old Batch Plant)

- Information from the SMP: Based on the recollection of a former Base employee, this area was nominated as a site by the QPMT. The former Base employee indicated that he believed that there was a former fire training area near Site 5 (Old Batch Plant [L-04]) on the Mainside of the MCBQ. During the research activities, no records or other historical information was available to corroborate that there was a former fire training area near L-04.
- IRP Closeout Document No. 24 noted that the site was active sometime between 1950 and 1970s and reportedly encompassed a small area (1,000 ft) in the vicinity of Site 5, the Old Batch Plant.
- Lower probability of PFAS.
 - No evidence this site was used as a fire training area, however this should be verified if possible.
 - Additional evaluation is warranted.



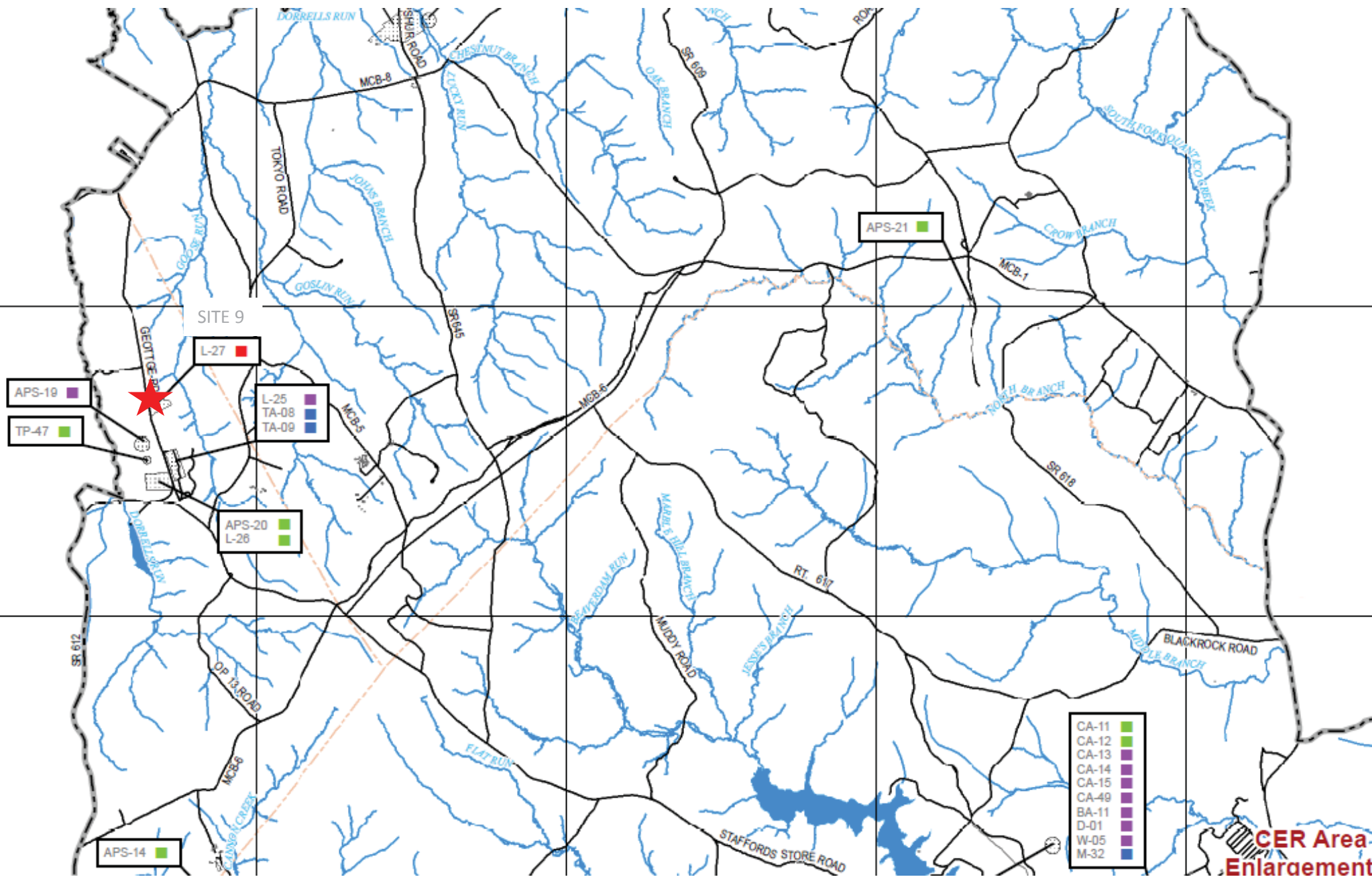
Site 8 (L-24) – Camp Barrett Disposal Area

- Information from the SMP: The site operated between 1958 and 1972. The site was reportedly used for the disposal of domestic refuse, construction debris, waste oil, and solvents from the barracks, dining halls, and motor pools at Camp Barrett. Approximately 560 tons of domestic refuse and construction debris per year were disposed at the site. During the 1960s, the Camp Fire Department reportedly burned trash at the site. This open burning occurred about three times per week. Waste motor pool oil and solvents, paper, and other combustibles were consumed. The remaining unburned trash and noncombustibles were bulldozed into trenches and covered.
- Lower probability of PFAS.
 - The items burned would not have required AFFF.
 - Propose no further action for this site.



Site 9 (L-27) – Camp Goettge Disposal Area

- Information from the SMP: The unit operated from 1950 to 1960. Approximately 140 tons per year of domestic refuse, construction and demolition debris, waste oils, solvents, paper, other combustibles, and noncombustibles were reportedly disposed at the site. During the period of use, the trash was reportedly burned by Camp Fire Department personnel. The open burning occurred about three times per week. The unburned trash and non-combustibles were bulldozed into trenches and covered with soil.
- Low probability of PFAS.
 - This disposal area was used prior to 1970 so AFFF was not used.
 - Propose no further action for this site.



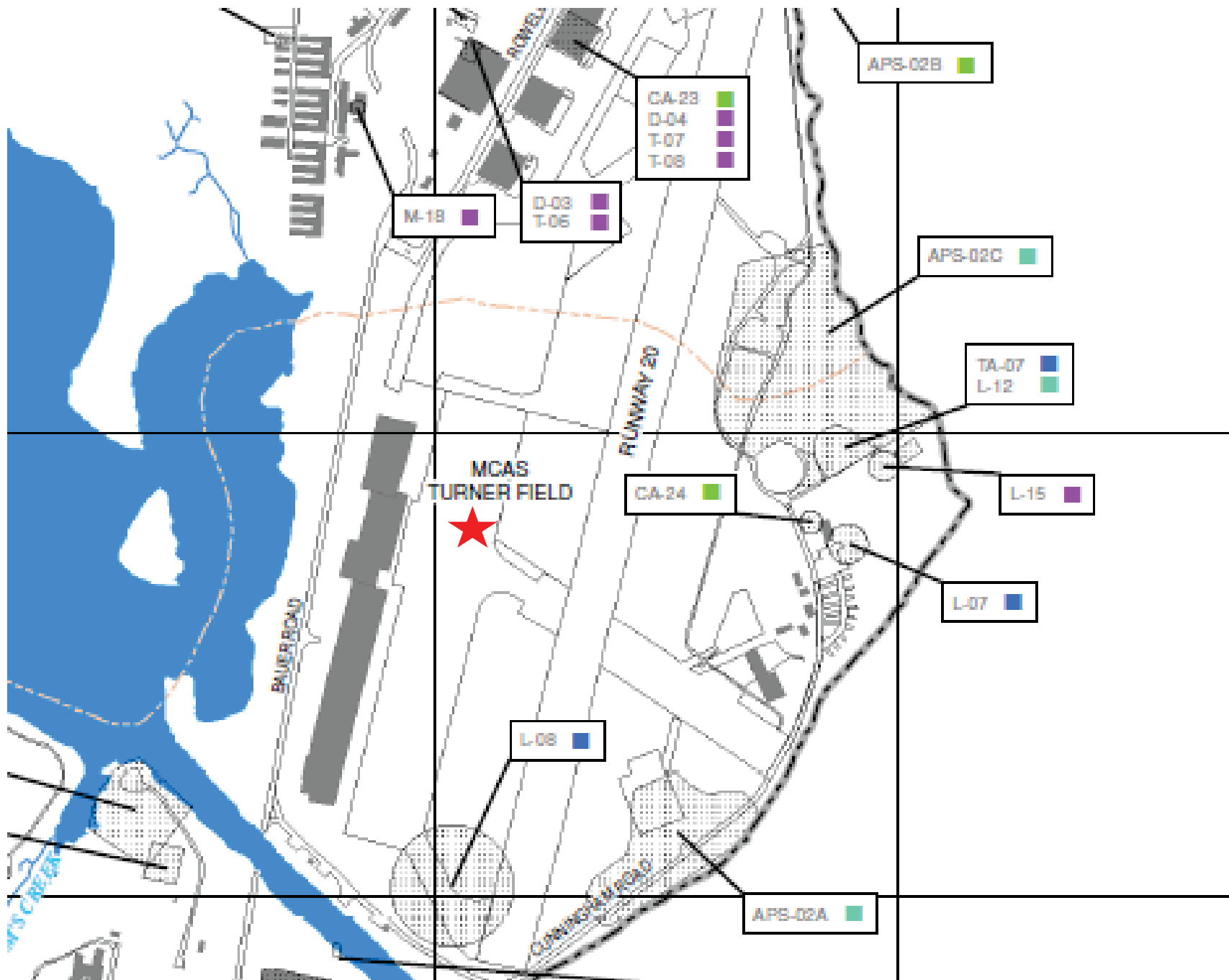
TA-07 – New Burn Pit Underground Tank

- Information from the SMP: The site consisted of two USTs, which were located approximately 20 feet northeast of the New Burn Pit Site (L-12) within the Marine Corps Air Facility Turner Airfield. The tanks were used to store surface water runoff from the T-58 Engine Test Pad (L-15) and from the New Burn Pit. No releases were identified at the site. The tanks were removed and disposed March 9, 1993.
- Low probability of PFAS.
 - The SMP stated that fire training activities did not occur at L-12.
 - Would be investigated further under APS-02C.
 - Propose no further action for this site.



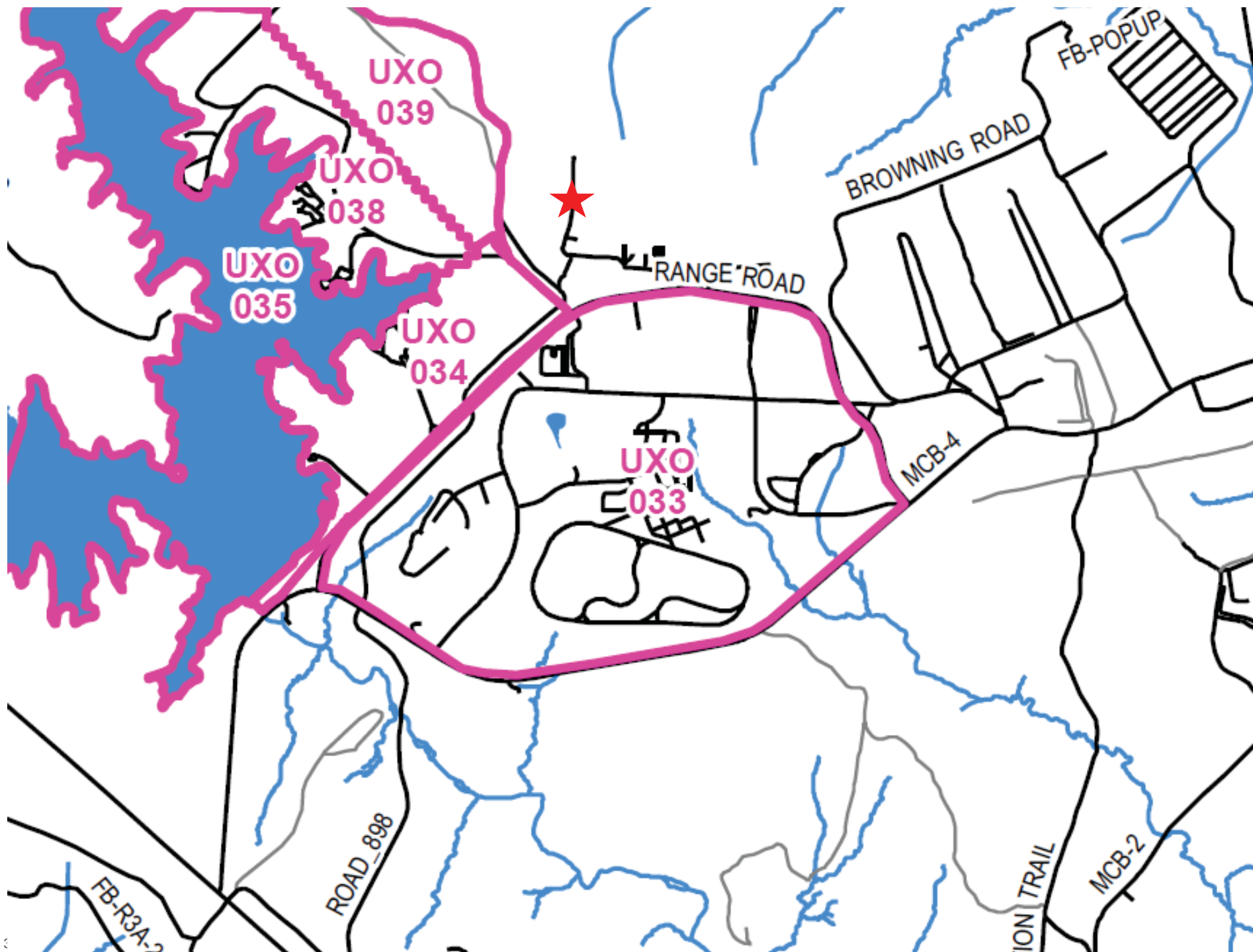
Marine Corps Air Facility Turner Airfield

- Although the Airfield is not an official “site” it should be investigated for possible crash sites, etc. In addition, hangars on the airfield may contain (or may have contained) AFFF fire suppression systems.
- Higher probability of PFAS.
 - AFFF fire suppression systems may be utilized in hangars.
 - Plane crashes may have occurred which were extinguished with AFFF.
 - Additional evaluation is warranted.



FBI Hostage Rescue Team

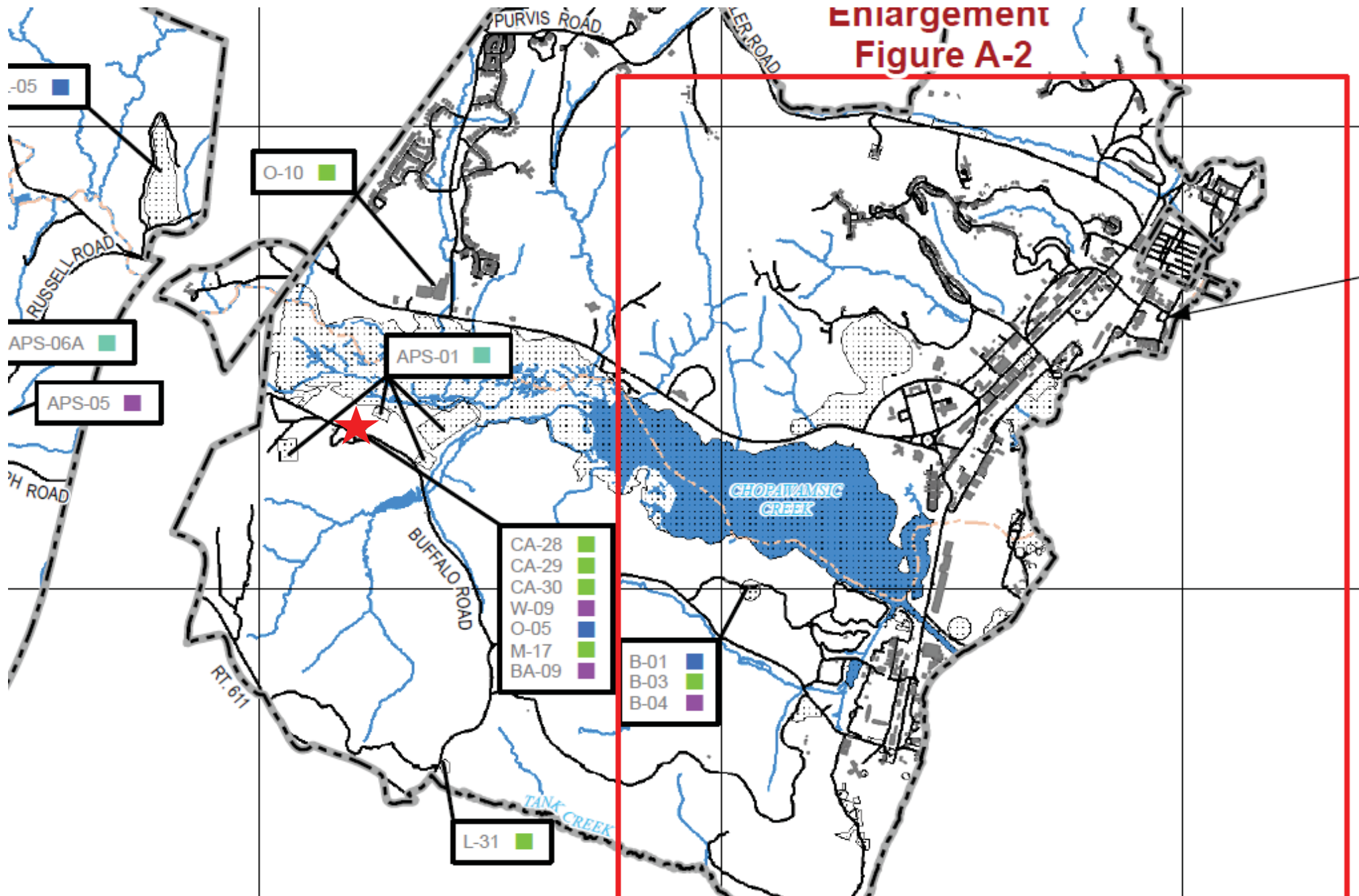
- Although the FBI Hostage Rescue Team is not an official “site” it should be investigated for possible crash sites, etc. In addition, hangars may contain (or may have contained) AFFF fire suppression systems.
- Higher probability of PFAS.
 - AFFF fire suppression systems may be utilized in hangars.
 - Plane crashes may have occurred which were extinguished with AFFF.
 - Additional evaluation is warranted.



Site 46 (CA-29) – Building 28000 Accumulation Area No. 2

- Information from the SMP: The site is 6-foot by 6-foot drum storage area. The area contained unidentified waste inside AFFF drums. Five 55- gallon closed-top drums were placed in direct contact with the ground surface. During a site visit, stains were noted on the soil surrounding the drums. The site is no longer used as an accumulation area. The site has been replaced with a new hazardous materials storage shelter.
- Low probability of PFAS.
 - It appears that AFFF may have been stored at the site, however it is not known if a release occurred.
 - Additional evaluation is warranted.

Enlargement
Figure A-2



Fire Stations

- Three fire stations are listed on the MCBQ website:
 - Fire Station 531 Mainside
 - Fire Station 532 Air Station/OCS
 - Fire Station 533 TBS/FBI
- AFFF may be stored at the fire stations.
- Higher probability of PFAS.
 - If AFFF was stored at the fire stations, a release may have occurred.
 - Additional evaluation is warranted.

Outstanding Questions

- Is AFFF still used at MCBQ?
- Where was AFFF stored at MCBQ? Have there been any releases? Is AFFF still stored at MCBQ?
- Do hangars at MCBQ currently have AFFF fire suppression systems? Did any hangars previously have AFFF fire suppression systems? If so, have there been any releases?
- Are there any electroplating activities at MCBQ? None are identified in the SMP.

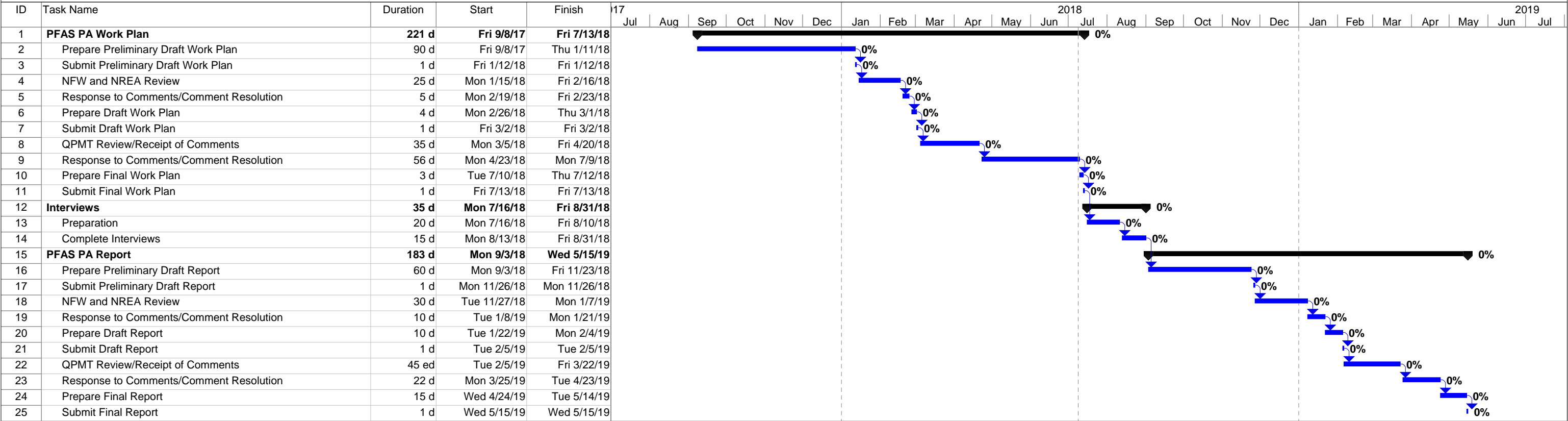
Path Forward

- Obtain answers to previous slide's outstanding questions (NREA assistance will be necessary)
- Prepare a Work Plan to send to the QPMT
- Complete a site visit to conduct interviews and view possible sites
 - The site visit and interviews may generate additional sites
- Prepare Desktop Evaluation Audit Report with findings and recommendations

Appendix B

Project Schedule

Appendix B
PFAS Preliminary Assessment Schedule



Legend

Summary



Summary Progress



Task



Task Progress



*1st and 2nd 5-Year Reviews addressed Site 4 only. All subsequent reviews will address multiple sites.

Appendix C
Site Visit Checklist and Interview
Questionnaire

Review of Potential Release of PFAS, including Historical Use of AFFFs

Site Visit Checklist

Marine Corps Base Quantico, Virginia

- Identify AFFF/PFAS releases
- Record detailed descriptions of each AFFF/PFAS release including source type, location, dimensions, quantity, and evidence of containment.
- Measure and record geodetic coordinates of approximate center of each site (new sites and existing FTAs); if approximate center of site is not safely accessible, record nearest safe accessible location and include a note on the difference.
- Mark on hard copy map approximate location and dimensions of AFFF/PFAS releases.
- Look for signs of migration of AFFF/PFAS releases (soil staining, etc.); check storm drains, oil/water separators and surface water pathways for releases. Note historical changes or modifications to storm water pathways.
- Obtain copies of any written records, including Fire Department and Emergency Response Records, etc. (the records can be burned to a CD or scanned using the TurboScan application if fax machine is not available).
- Record descriptions of observed areas of stained soil or stressed vegetation.
- Identify any wells on site and any onsite sensitive environments.
- Identify surface waterbodies and residences, schools, or sensitive environments on or adjacent to the site.
- Prepare a site sketch to include locations and dimensions of all AFFF/PFAS releases, distance from release to major site structures, locations and distances from release to all sensitive areas, significant site features, and the drainage pattern and overland flow to surface water.
- Identify specific areas where AFFF/PFAS disposal, storage, or handling may have occurred.
- Identify where empty AFFF containers may have been rinsed and/or disposed.
- Identify receptor for each pathway.
- Take two photographs of each site from two different directions and record photo numbers and descriptions on the photograph log.
- Obtain copies of existing FTA and non-FTA site reports (RI, FS, other documents) if not available from Administrative Record.

Interview Questions
Review of Potential Release of PFAS, including Historical Use of AFFF
Marine Corps Base Quantico

Date: _____

Time: _____

Interviewer (*signature*): _____

Interviewee: _____

Position/Job Title: _____

How long at current position: _____

How long at this Base in current and previous positions: _____

Have you had similar position(s) at other Bases: _____

Which Bases and how long: _____

Phone/ Email: _____

1. What types of firefighting foams are used at MCBQ?

Check all that apply

- a. 3% AFFF
- b. 6% AFFF
- c. High Expansion Foam
- d. Other; please list:

Note(s): Different between currently used/ previously used?

2. What manufacturer's AFFF products are used at MCBQ?

- a. 3M
- b. Ansul
- c. Chemguard
- d. other; please list:

3. Where has the AFFF solution been stored, transferred, or handled? (*Will cross-check with CH2M's table- List of Interviewees and Areas of Interest for AFFF and PFAS Assessment. Place on Map if not already identified*)

4. Is there secondary containment in the stored area(s)?

Yes

No

Additional Comments:

5. Are your automated fire suppression systems currently charged with AFFF or have they been retrofitted for use of high expansion foam?

a. currently charged with AFFF

b. retrofitted for use of high expansion foam

Additional Comments:

6. Do you have an inventory of the amount of AFFF stored on MCBQ or present in automated fire suppression systems?

Yes

No

Additional Comments:

7. Can you describe the procedure for how the suppression systems are supplied with AFFF?

8. Have there been inadvertent releases of AFFF from hangar fire suppression systems?

Yes

No

If Yes, When/Where? *(Will cross-check with CH2M's table- List of Interviewees and Areas of Interest for AFFF and PFAS Assessment. Place on Map if not already identified)*

Additional Comments:

9. How are discharges handled (i.e. when the suppression system goes off)?

10. Provide a list of trucks and trailers currently carrying AFFF and where they are parked/stored? *(Will cross-check with CH2M's table- List of Interviewees and Areas of Interest for AFFF and PFAS Assessment. Place on Map if not already identified)*

11. Approximately how much AFFF (gallons) is carried/stored in the specified trucks/trailers?
Maybe multiple answers if there are more than one truck/trailer:

12. Is this truck(s) tested for spray patterns to make sure the equipment is working properly?
Maybe multiple answers if there are more than one truck/trailer:

13. How often are these spray tests performed?

14. Can you provide the locations of these spray tests (historically and presently)?
If hard copy map; mark up the map and label. If use of electronic map- then mark on electronic file. *(Will cross-check with CH2M's table- List of Interviewees and Areas of Interest for AFFF and PFAS Assessment. Place on Map if not already identified)*

15. Can you describe the procedure for how trucks and trailers are supplied with AFFF?
16. Where does this resupply occur?
If hard copy map; mark up the map and label. If use of electronic map- then mark on electronic file.
(Will cross-check with CH2M's table- List of Interviewees and Areas of Interest for AFFF and PFAS Assessment. Place on Map if not already identified)
17. Can you provide the procedures for how these vehicles are cleaned/decontaminated currently as well as in the past?
18. When AFFF was used during a fire training exercise, how was the AFFF cleaned up and disposed of?
19. Do you have recollection or records of AFFF being used in response to:
- a. Fuel releases to prevent fires: yes/no
Open response for description
 - b. Historical emergency response sites (i.e. crash sites and fires): yes/no
Open response for description
 - c. Emergency runway landings where foam might have been used as a precaution: yes/no
Open response for description
 - d. Other usage (e.g., weed control, dust suppression, etc.): yes/no
Open response for description

20. If no written records or incomplete written records, do you have anecdotal/verbal information and locations of spills or other emergency response incidents where AFFF was used?

Yes/No

Additional Comments:

21. What are the Non-FTA locations where:

- a. AFFF suppression systems are installed or AFFF/PFAS stored or used or disposed (i.e. hangars, fire stations, maintenance areas, wastewater treatment plants, metal plating facilities, AFFF ponds/lagoons, and/or aerospace, automotive, electronic facilities) *(Will cross-check with CH2M's table- List of Interviewees and Areas of Interest for AFFF and PFAS Assessment. Place on Map if not already identified)*

Enter Site/ Building Number/ Location Description:

- b. Does this location(s) currently contain or has it contained AFFF/PFAS in the past?

Enter Site/ Building Number/ Location Description:

Current

Past

Enter Site/ Building Number/ Location Description:

Current

Past

Enter Site/ Building Number/ Location Description:

Current

Past

- c. If converted from AFFF, when did they convert the system to high expansion foam?

Enter Site/ Building Number/ Location Description:

Enter year

Enter Site/ Building Number/ Location Description:

Enter year

Enter Site/ Building Number/ Location Description:

Enter year

Enter Site/ Building Number/ Location Description:

Enter year

22. Identify All Fire-training Areas, which currently or historically used AFFF. *(Will cross-check with CH2M's table- List of Interviewees and Areas of Interest for AFFF and PFAS Assessment. Place on Map if not already identified)*

- a. For each FTA:

What were the years of operation?

- b. Approximately how much AFFF was released at this FTA?

Enter volume in gallons or unknown

- c. Is FTA active or inactive?

Active/inactive

If inactive, when was the last time that fire training using AFFF was conducted?

Enter year

- e. What types of fuels/flammables were used at this FTA?

- f. Was remedial action conducted at this FFA?

Yes/No

Describe (response action and when)

If yes, was a new FTA constructed on top of the original FTA following remediation?

23. What are the current fire-fighting training practices?

24. Do you have a chrome plating shop on base? *(Will cross-check with CH2M's table- List of Interviewees and Areas of Interest for AFFF and PFAS Assessment. Place on Map if not already identified)*

Yes/No:

Years of operation?

Enter date range

25. Is there anyone else or other base organization personnel that you would recommend we interview?
(Will cross-check with CH2M's table- List of Interviewees and Areas of Interest for AFFF and PFAS Assessment)

Action Items:

Appendix D

Records of Communication Form

[illegible]

[illegible]

Action Items or Follow Up Actions:

[illegible]

Appendix E

Photograph Log

PHOTOGRAPH LOG

Team:	Date:
Project Number:	Observation Period: Start _____ Stop _____

Weather

[illegible]